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SHOE FABRICS

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This invention relates to fabrics and other sheet materials intended more especially, but not exclusively, for use in the uppers of shoes.

In certain classes of shoes, more particularly various grades of novelty footwear, it is a common practice to replace part, or all, of the upper leather of the shoe with a fabric which usually is made of a very open mesh construction. In order to make such a fabric hold its shape in the shoe it is necessary to impregnate it with a stiffening or sizing agent designed to give the fabric considerably more stability, while still enabling it to flex or bend to the desired degree with the movements of the foot. Most, if not all, of the sizing or stiffening agents commonly used for this purpose are readily softened or dissolved by water. Consequently, whenever a shoe having an upper made from such material is thoroughly wet it loses its shape and becomes excessively pliable, the stiffening agent failing to perform the functions for which it was originally put into the fabric. After several such wettings a high proportion of said agent disappears and the upper of the shoe becomes permanently misshapen.

A further function which is desirably performed by a stiffening agent is to bond the threads and fibers of the fabric more securely together and thus to improve the resistance of the goods to wear, to prevent fraying, and to enable the fabric better to hold the stitches by which it is secured to the other parts of the shoe. Many of the stiffening agents commonly used, however, perform this function to only a minor degree. In fact, some of them appear to make the strands and fibers of the fabric so brittle that they are weakened, causing the fabric to cut readily, and producing excessive abrasion of the strands where they cross each other.

The present invention deals especially with these conditions and it aims to devise a thoroughly practical solution for them. Stated more specifically, the invention aims to overcome the difficulties above mentioned while at the same time maintaining the expense of manufacture within entirely reasonable limits. The invention involves both a novel product and also a new method of manufacture.

I have found that the foregoing objects can be realized by protecting the main body of a stiffened sheet and the sizing agent used in it with a water resistant coating of a nature consistent with the purposes for which the product is to be used and the functions that it is to perform.

A typical method of making a product embodying this invention comprises the sizing of a fabric or other suitable sheet material with suitable sizing or stiffening agents such as those heretofore used, starch, for example, being the material most commonly employed. This operation may be performed in the usual manner. Usually the web of sheet material is run through a bath of the sizing or stiffening agent, the surplus is squeezed out, and the sized sheet is dried. The web or sheet so prepared is next run through a bath of the water resisting coating material. Preferably such a bath contains as its essential constituent a relatively high proportion of rubber latex or some equivalent water dispersion of rubber. I have obtained the best results by using a vulcanized latex such as that commonly obtainable in the market under this name or under the commercial name of "Vultex". It is desirable, also, to add to this bath certain other constituents for the purpose of modifying the characteristics of the final product.

An entirely satisfactory coating compound may be prepared by mixing together two hundred fifty (250) parts of vulcanized latex containing approximately forty percent (40%) of solids, one part of a twenty percent (20%) solution of casein, forty (40) parts of titanium oxide, sixty (60) parts of Norris whiting, four (4) parts of a fifty percent (50%) paraffin wax emulsion, and one hundred (100) parts of water, all of the proportions being by weight. In this mixture the casein acts as a protective colloid for the particles of rubber in the latex. The titanium oxide and the whiting are mineral fillers present in a finely divided form and they serve partly to give the desired color to the finished article and partly, also, to reduce the rubbery feel which the final product otherwise would have and which is usually objected to by the trade. The paraffin wax emulsion is readily miscible with the latex and is valuable as an added waterproofing agent. Usually the fillers are ground with the water until a smooth mixture is produced and they are then added to the latex, casein solution and the wax emulsion, the entire mass being mixed thoroughly. Further dilution of the mixture with water usually also is desirable, the consistency being determined by the requirements of individual products. In a typical case the mixture produced in the manner above described is diluted with an equal volume of water.

This coating compound is applied to both sides of the previously sized and dried sheet material,

preferably by running the web through the coating bath. It should also be passed between squeeze rolls to remove the surplus coating compound and finally dried. It is then ready to be cut up for use in shoes or other articles.

The strands and fibers of a fabric so prepared are well bonded together, they are strongly resistant to fraying and abrasion, and they are affected to only a negligible extent by any wetting to which shoes ordinarily are subjected. While such a product is not waterproof in the strict or scientific sense of that term, nevertheless it is highly resistant to wetting. This result is produced by the fact that the main body of the product, whether made of fabric or other sheet materials used for this purpose, together with the stiffening agent with which the sheet is impregnated, are coated with an extremely thin but relatively impervious layer of vulcanized latex rubber preferably associated, also, with a waterproof wax. Consequently, water does not reach the sizing in sufficient quantities to dissolve any very substantial proportion of it. This fabric, therefore, is affected to only a minor degree by conditions which would practically destroy the stiffening properties of an ordinary article of this character.

While a typical method of procedure has been described above, it will be understood that this disclosure has been made rather by way of illustration than limitation and that the particular substances used and, to some degree, the procedure followed, necessarily will depend upon the requirements of individual cases. Usually, as above stated, the body of the sheet consists of a fabric although other sheet materials, particularly those made of felted fiber, have been used for this purpose and a great variety of fabrics are so employed. In some cases the fabrics are in the nature of canvas, twills, or light weight ducks, while in others they are of an open mesh construction. Usually the latter fabrics are fairly thick, the filling being similar to a common cotton twine but more loosely twisted, and the warp being somewhat smaller. Such a fabric is extremely pliable before being sized. Usually, also, such fabrics are bleached prior to the sizing operation since for the more common uses to which they are put require them to be very white in color. Colored fabrics or other sheet materials may, however, be used, and the nature of the filler mixed with the other constituents of the waterproofing bath will be partly determined by considerations of color. Clay, talc, whiting, and various powdered pigments are suitable as fillers. A great variety of waxes can be substituted for the paraffin above mentioned, such for example, as carnauba, bees wax, candellila wax, and others, all of which can be emulsified. Unvulcanized latex and water dispersions of rubber can be used instead of vulcanized latex and the fabric can be passed through a vulcanizing operation subsequent to coating. I have obtained the best results, however, by using a vulcanized latex.

The impregnation of the fabric first with a sizing or stiffening agent and subsequently with a dispersed waterproofing material produces a final product much superior to any which I have succeeded in making by combining the stiffening agent with the waterproofing material and impregnating the fabric in a single treatment. This appears to be due to the fact that the liquid in which the rubber particles and the wax are dispersed is a solvent for the sizing or stiffening agent. When the stiffened sheet is run through the waterproofing bath the stiffening agent is softened or dissolved to a substantial degree by the dispersing medium which, in this particular case consists chiefly of water, and a relatively high degree of penetration of the solid waterproofing constituents is produced due to the fact that there is present in the goods a soluble sizing or stiffening agent. The sizing material bonds securely to the cellulosic fiber of the fabric or other sheet material and the union of the waterproofing material to the goods is facilitated by the mutual solubility or dispersability of both materials in the water or other dispersing medium. The rubber particles, therefore, are interspersed with the sizing, a substantial proportion of them adhere directly to the fiber, while at the same time a sufficient quantity of rubber is used to provide a highly resistant film for protecting both the fiber of the goods and the sizing agent.

A further advantage of this product is that while a sufficient proportion of fillers may be used to substantially eliminate the rubbery feel which the goods otherwise would have, these fillers are, nevertheless, bonded to the other constituents of the finished product so firmly that they do not flake or rub off to any substantial degree. In fact, a sufficient proportion of waterproofing constituents preferably is used to bond the fibrous materials, the sizing and the fillers together into an approximately unitary structure. If desired, the sheet after being completed in the manner above described may be dusted with talc, sizing, or the like, to eliminate any remaining traces of a rubbery feel.

While I have herein described a sheet material designed especially for use in shoes, it will be understood that such a product is also useful in other relationships.

Having thus described my invention, what I desire to claim as new is:

1. That improvement in methods of making stiffened shoe upper material and protecting same from the action of moisture, comprising the steps of impregnating said material with a starchy sizing agent which adheres firmly to the fibers of the material, rendering same stiff and stable, yet flexible to the requirements of a shoe upper, squeezing out surplus amounts of such agent, subsequently impregnating the material so treated with a water dispersion of a waterproofing agent and then drying said product, a sufficient proportion of solid waterproofing constituents being used to protect both the fiber of the goods and said stiffening agent.

2. That improvement in methods of making stiffened shoe upper fabrics of an open mesh construction, and protecting same from the action of moisture, comprising the steps of impregnating said material with a starchy sizing agent which adheres firmly to the fibers of the material rendering same stiff and stable, yet flexible to the requirements of a shoe upper, squeezing out surplus amounts of such agent whereby to maintain the mesh of the fabric in its original open condition, subsequently impregnating the material so treated with a water dispersion of a waterproofing agent and then drying said product, a sufficient proportion of solid waterproofing constituents being used to protect both the fiber of the goods and said stiffening agent.

3. A stiffened, water-resistant, shoe upper material comprising a fabric impregnated with sufficient starchy sizing agent to render the fabric stiff and stable, yet flexible to the requirements

of a shoe upper, and a flexible, water-resistant coating protecting said fabric and said agent and containing a high proportion of vulcanized latex rubber.

4. A stiffened, water-resistant, shoe upper material comprising an open mesh fabric, the fibers of which are impregnated with sufficient starchy sizing agent to render the fabric stiff and stable, yet flexible to the requirements of a shoe upper, without filling said open meshes, and a flexible water-resistant coating protecting said fabric and said agent and containing a high proportion of vulcanized latex rubber.

5. A stiffened, water-resistant, shoe upper material comprising a fabric impregnated with sufficient sizing of a starchy nature to render the fabric stiff and stable, yet flexible to the requirements of a shoe upper, and a flexible, water-resistant coating adhesively united with and protecting said fabric and said sizing, said coating containing a high proportion of vulcanized latex rubber and a sufficient percentage of a finely divided filler to substantially reduce the rubbery feel which otherwise would be imparted to the finished product.

6. A stiffened, water-resistant, shoe upper material comprising a fabric impregnated with sufficient sizing of a starchy nature to render the fabric stiff and stable, yet flexible to the requirements of a shoe upper, and a flexible, water-resistant coating adhesively united with and protecting said fabric and said sizing, said coating containing a high proportion of vulcanized latex rubber, a small but substantial percentage of a wax, and a substantial percentage of a finely divided powdery filler.

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